

A NEWLY RECORDED TRIBE OF FAMILY ONYCHIURIDAE (COLLEMBOLA, PODUROMORPHA) WITH A NEW SPECIES AND A NEWLY RECORDED SPECIES FROM NORTHEAST CHINA

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Abstract The tribe Oligaphorurini Bagnall, 1949 with a new species *Dimorphaphorura sanjiangensis* sp. nov. and *Oligaphorura ursi* Fjellberg, 1984 are recorded from Northeast China. The morphological descriptions and illustrations of the two species are given. All specimens are deposited in the Key Laboratory of Wetland Ecology and Environment, Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, Changchun.

Key words Collembola, Onychiuridae, Oligaphorurini, *Dimorphaphorura*, new species, *Oligaphorura*, new record, Northeast China.

1 Introduction

Bagnall (1949) established the subfamily Oligaphorurinae for the species having small postantennal organ, including four genera *Archaphorura*, *Dimorphaphorura*, *Micraphorura* and *Oligaphorura*. Weiner (1996) and Pomorski (1996) redefined this group as a tribe, Oligaphorurini, and characterized it by the postantennal organ with a vesicle divided into 3–6 lobes. Oligaphorurini is divided into five genera, *Chribellaphorura*, *Archaphorura*, *Dimorphaphorura*, *Oligaphorura* and *Micraphorura*, according to the furcal morphology, the presence or absent of the apical vesicle on the fourth antennal segment, accreted or free of the abdominal terga V and VI. Up to now, among the 38 species of the tribe known in the world, no species are known in China (Bellinger *et al.*, 2011).

While examining the specimens collected from Northeast China, a new species belonging to *Dimorphaphorura* and a newly recorded species belonging to *Oligaphorura* are found and are described in present paper.

Oligaphorurini Bagnall, 1949 New record to China

Oligaphorurinae Bagnall, 1949: 500.

Oligaphorurini Bagnall, 1949 stat. nov. Pomorski, 1996: 99.

Diagnosis (after Pomorski, 1998)

Granulation fine, a little coarser around pseudocelli at antennal base and abdominal segments IV–V. Dorsal cephalic chaeta d0 absent. S-chaetae on head and body distinct from ordinary chaetae. PAO located on cuticular furrow built with a 3–6

lobed vesicle. Pseudocelli on posterior head, lateral thoracic segments and abdominal segments present. Furcal rudiment as a finely granulated area or a small cuticular fold. Tibiotarsus with 11, rarely 5 chaetae in the distal whorl. Anal spines present or not, if present, usually without papillae.

Dimorphaphorura versus *Oligaphorura*

The two genera are very similar in apical bulb on Ant. IV absent; antennal III and IV free; abdominal segments V and VI free; anal spine present; chaetae in the distal whorl of tibiotarsus acuminate. However, they can be easily distinguished by the furcal morphology (*Dimorphaphorura* with a furca reduced to a finely granulated area with 1+1 chaetae in one row posteriorly, while *Oligaphorura* with a furca reduced to a small cuticular fold with 2+2 chaetae posteriorly).

2 Material and Methods

Specimens were mounted in Marc André II solution, after clearing in lactic acid, and were studied using a standard light microscope equipped with a drawing attachment. Specimens are deposited in the Key Laboratory of Wetland Ecology and Environment, Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, Changchun.

Abbreviations used in descriptions. Ant. - antennal segments, AIII-O-Sensory organ of third antennal segment, PAO-postantennal organ, Th. - thoracic segments, Abd. - abdominal segments, p-chaeta-chaeta of row p on head, Sp-posterior S-chaeta (on Abd. V or on head), ms-S-microchaeta

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(microsensillum), pso-pseudocelli, a-pso-postero-internal pso on head, psp-pseudopore, AS-anal spines, x-axial psp of Abd. IV.

Labial papillae types are named after Fjellberg (1999). Labium areas and chaetal nomenclature follow Massoud (1967) and D'Haese (2003). Chaetae on anal valves are named after Yoshii (1996).

Labral chaetae formula is the number of chaetae from prelabrals to distal row of labrum; for instance: 4/342.

Pseudocellar and pseudopore formulae are the number of pseudocelli and pseudopores by half-tergite (dorsally) or half-sternite (ventrally) as follows: head anterior, head posterior/Th. I, Th. II, Th. III/Abd. I, Abd. II, Abd. III, Abd. IV, Abd. V, Abd. VI (for instance: 32/033/333430).

S-chaetae formula is the number of S-chaetae by

half-tergite from head to Abd. VI (for instance: 11/022/222110).

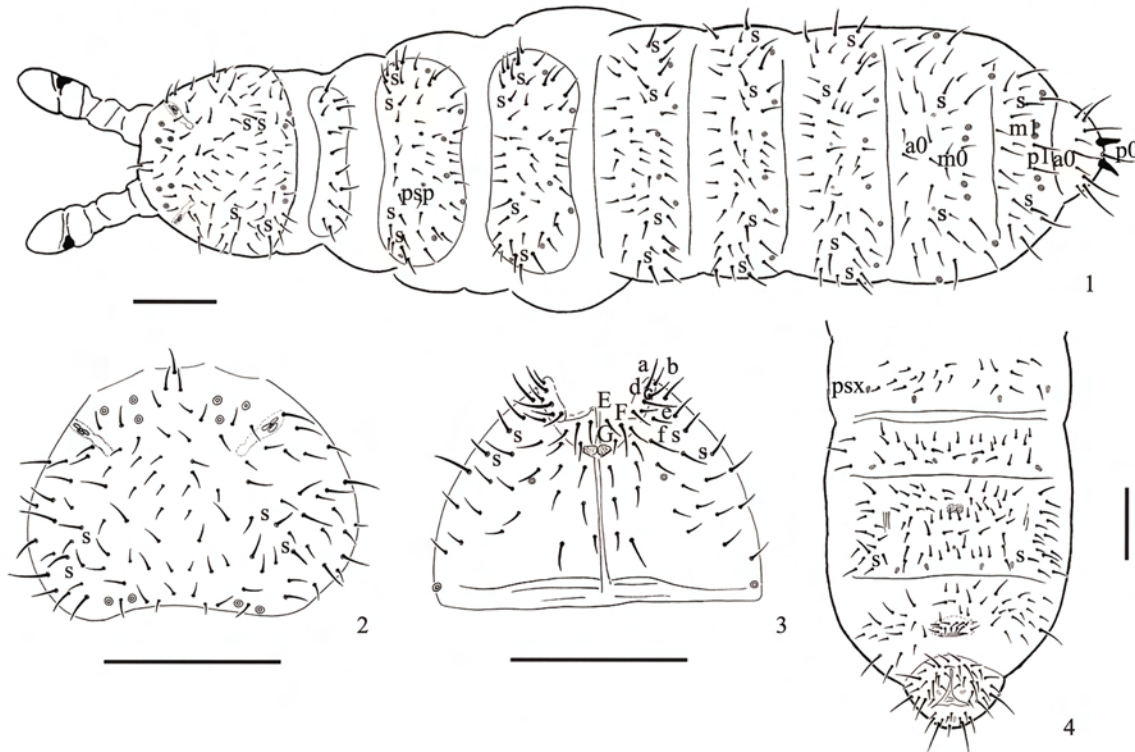
Formula of tibiotarsal chaetotaxy: total number of chaetae (number of chaetae in the distal whorl (A + T), number of chaetae in the proximal whorl B, number of basal chaetae); for instance: 20 (11, 8, 1).

3 Systematics

Dimorphaphorura sanjiangensis sp. nov. (Figs 1 – 11)

Holotype female; paratypes: 3 females, 1 male, China, Heilongjiang Province, Honghe Farm, 1 Oct. 2010, soil, Berlese extraction, CHANG Liang *et al.*, leg. (CHI-3THX).

Description. Body length 0.9 – 1.0 mm. Body shape cylindrical, body sides parallel. Body colour white in alcohol.



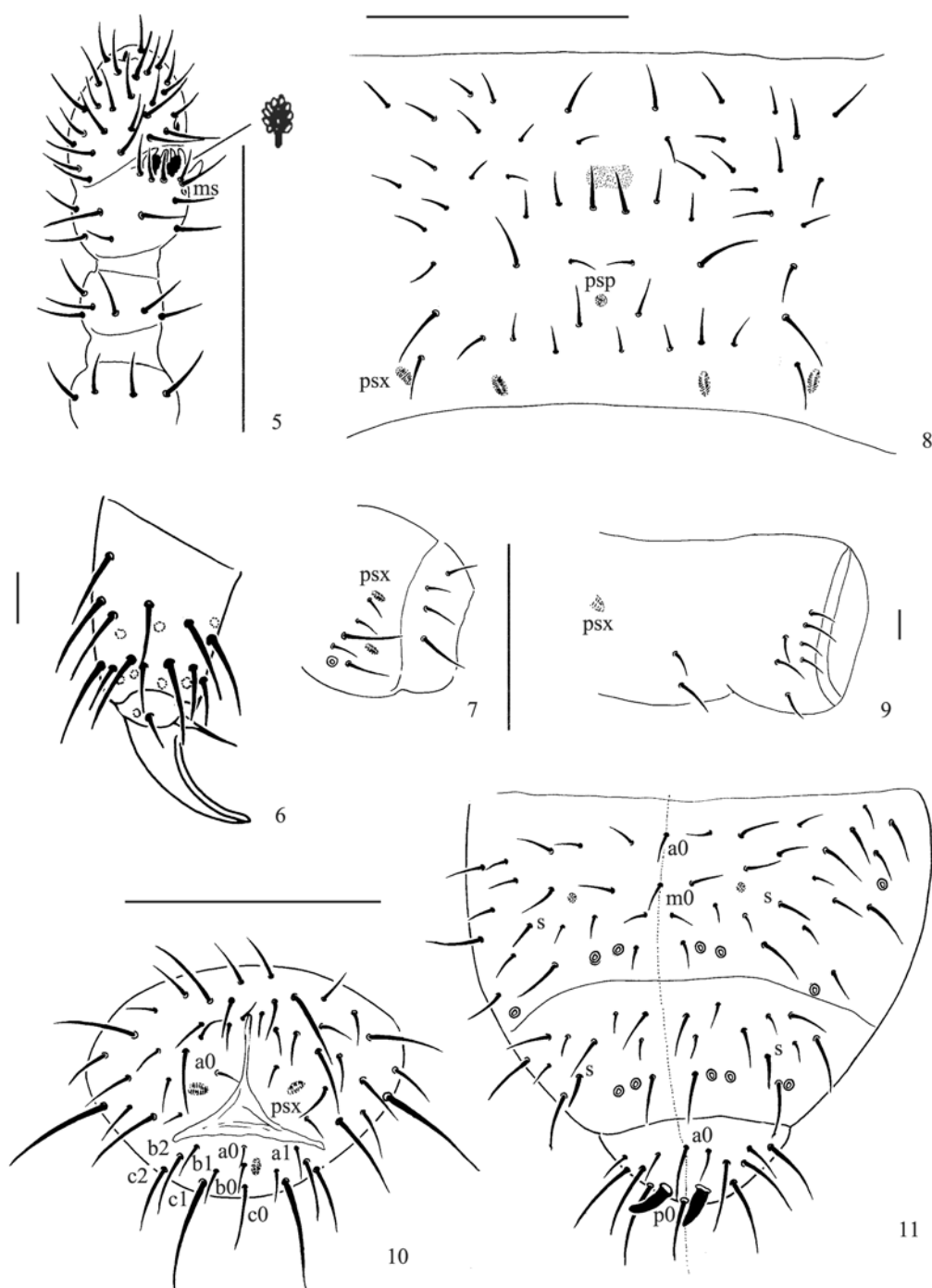
Figs 1–4. *Dimorphaphorura sanjiangensis* sp. nov. 1. Dorsal side of body. 2. Dorsal side of head. 3. Ventral side of head. 4. Ventral side of Abd. II – VI. Scale bars: 1–4 = 0.1 mm.

Pseudocellar formulae as 32/033/333430 dorsally, 11/000/000000 ventrally, subcoxa 1 of legs I, II and III with 1, 1 and 1 pso respectively (Fig. 1). Parapseudocelli: formulae as 00/000/122203 ventrally (Fig. 4), dorsal side absent; subcoxa 1 of legs I, II and III with 2, 2 and 2 psx respectively. Pseudopore formulae as 00/011/111100 dorsally, 00/111/000x00 ventrally (Fig. 1).

S-chaetae formula as 11/022/222110 dorsally, 11/000/000100 ventrally (Figs 1, 3–4). Sp present on head (Fig. 2). S-microchaetae tiny and blunt,

present on Th. II and III dorsally (Fig. 1).

Head. Antennae short and distinctly segmented, as long as head. Length ratio of antennal segments I : II : III : IV = 1.0 : 1.5 : 1.5 : 1.5 (Fig. 5). Ant. I with 9–10 chaetae. Ant. II with 14–15 chaetae. Ant. III sensory organ composed of 5 papillae, 5 guard chaetae, 2 small rods and 2 granulated sensory clubs, both morel-like; lateral ms just posterior to sensory organ. Ant. IV subapical organite rod-like; basolateral ms at about 1/4 length from base; invaginated apical bulb absent (Fig. 5). Antennal



Figs 5 – 11. *Dimorphaphorura sanjiangensis* sp. nov. 5. Antenna. 6. Distal part of leg II. 7. Subcoxa of leg II. 8. Furcal area. 9. Ventral tube. 10. Anal valves. 11. Dorsal side of Abd. IV – VI. Scale bars: 5, 7 – 8, 10 – 11 = 0.1 mm; 6, 9 = 0.01 mm.

base without distinct granulation. PAO located on cuticular furrow, prolonged on dorsal side of head, built with 1 three-lobed vesicle (Fig. 2). Dorsal cephalic chaeta d0 absent. 3 + 3 p-chaetae between posterior a-pso on head (Fig. 2). Mandible with strong molar plate and 4 apical teeth. Maxilla bearing 3 teeth and 6 lamellae. Maxillary palp simple with 1 basal chaeta and 2 sublobal hairs. Labral chaetae formula 4/342. Labium with 6 proximal, 4

basomedian (E, F, G and f) and 6 basolateral (a, b, c, d, e, e') chaetae (Fig. 3); labial papillae of A type, papillae A – E respectively with 1, 4, 0, 3 and 3 guard chaetae. Postlabial chaetae 3 + 3 along ventral groove (Fig. 3).

Body chaetotaxy. Ordinary chaetae differentiated in meso- and macro-chaetae, ratio Sp:m1:p1 on Abd. V = 1.0:0.5:1.3 (Fig. 1). Th. I with 8 – 9 + 8 – 9 chaetae dorsally. Three chaetae on both side of axial

line and no dorsal axial chaetae from Th. II to Abd. III tergites. Abd. IV tergite with two dorsal axial chaetae (a0 and m0), Abd. V tergite without axial chaeta, Abd. VI with two dorsal axial chaetae (a0 and p0) (Fig. 1). Th. I, II and III sternites with 0 + 0, 1 + 1, 1 + 1 chaetae respectively.

Appendages. Subcoxa 1 of legs I, II and III with 4, 5 and 5 chaetae, subcoxa 2 with 1, 4 and 4 chaetae respectively (Fig. 7). Tibiotarsi of legs I, II and III with 20 (11, 8, 1), 20 (11, 8, 1) and 20 (11, 8, 1) chaetae (Fig. 6). Unguis without teeth. Unguiculus slender and pointed, 0.5 times as long as inner edge of unguis, with inner basal lamella (Fig. 6). Ventral tube with 7 + 7 distal chaetae, 2 + 2 basal chaetae, without anterior chaetae (Fig. 9). Furca reduced to a finely granulated area, with 1 + 1 chaetae in one row posterior to furcal rudiment (Fig. 8).

Female genital plate with 12 anterior and 2 genital chaetae, male genital plate with 12 anterior and 8 genital chaetae. Male ventral organ absent. Anal valves with numerous acuminate chaetae; each lateral valve with chaetae a0 and 2a1; upper valves with chaetae a0, 2a1, b0, 2b1, 2b2, c0, 2c1, 2c2 (Fig. 10). Anal spines set on indistinct papillae, 0.8 times as long as inner edge of leg III unguis.

Etymology. Named after the type locality.

Habitat. In the farmland cropped with soybean.

Distribution. China (Heilongjiang).

Remarks. The new species shares with *D. chatyrdagi* (Kaprus, Weiner & Pomorski, 2002) the same dorsal and ventral pso formula, the same number of pso on subcoxa 1 of legs I – III, presence of ms on Th. III, presence of the basal lamella on unguiculus and presence of two dorsal axial chaetae (a0 and p0) on Abd. VI, absence of dorsal axial chaetae on Abd. V. But they can be easily separated by the following characters: psx (present in the new species and absent in *chatyrdagi*), S-chaeta (present in the new species and absent in *chatyrdagi*), dorsal axial chaeta a0 on Abd. IV (present in the new species and absent in *chatyrdagi*), number of chaetae in the distal whorl of tibiotarsus (11 in the new species and 5 in *chatyrdagi*).

Oligaphorura ursi Fjellberg, 1984 (Figs 12 – 19)

Material examined. 15 females on slide, China, Heilongjiang Province, Honghe Farm, 1 Oct. 2010, soil, Berlese extraction, CHANG Liang *et al.*, leg. (CHI-3THX); *ibid*: 11 females and 5 males on slide, 26 May 2011, soil, Berlese extraction, WU Hai-Tao *et al.*, leg. (CHI-3QZ).

Description. Body length: 1.0 – 1.3 mm. Body shape cylindrical, body sides parallel. Body colour white in alcohol.

Pseudocellar formulae as 32/133/333430

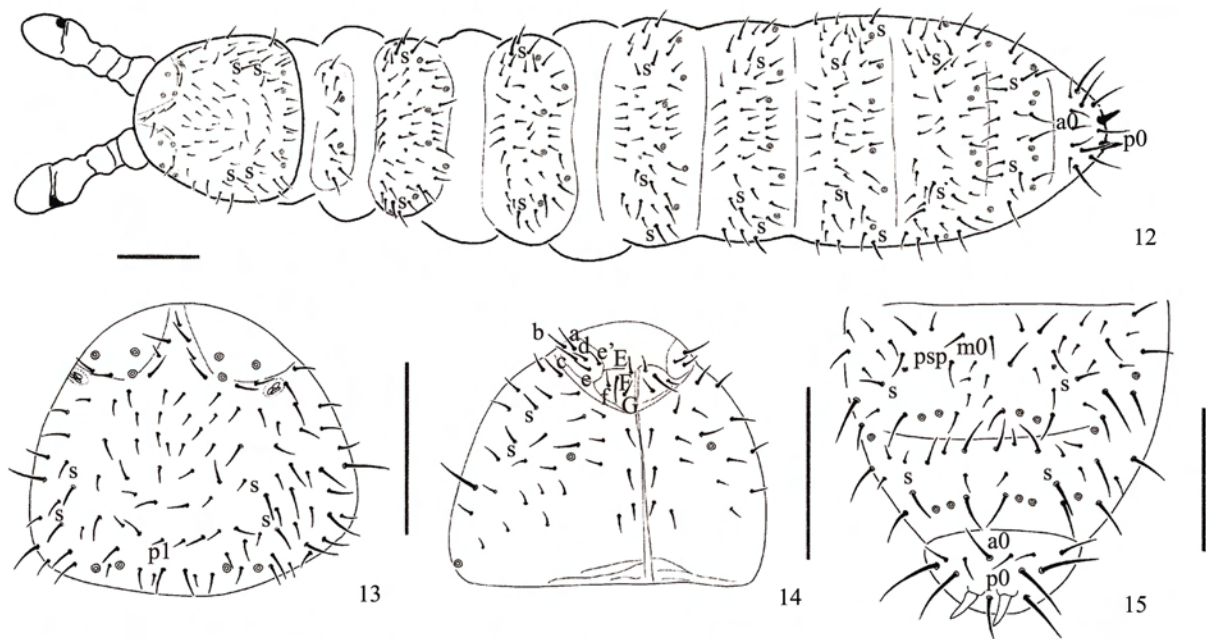
dorsally, 11/000/000000 ventrally (Fig. 12), subcoxa 1 of legs I, II and III with 1, 1 and 1 pso respectively. Parapseudocelli: formulae as 00/000/122200 ventrally, dorsal side absent (Fig. 16); subcoxa 1 of legs I, II and III without psx. Pseudopore formulae as 00/011/111100 dorsally, 00/111/000x00 ventrally (Figs 12, 16).

S-chaetae formula as 11/011/222110 dorsally, 11/000/000100 ventrally (Fig. 12). Sp present on head. S-microchaetae tiny and blunt, present on Th. II, absent on Th. III dorsally (Fig. 12).

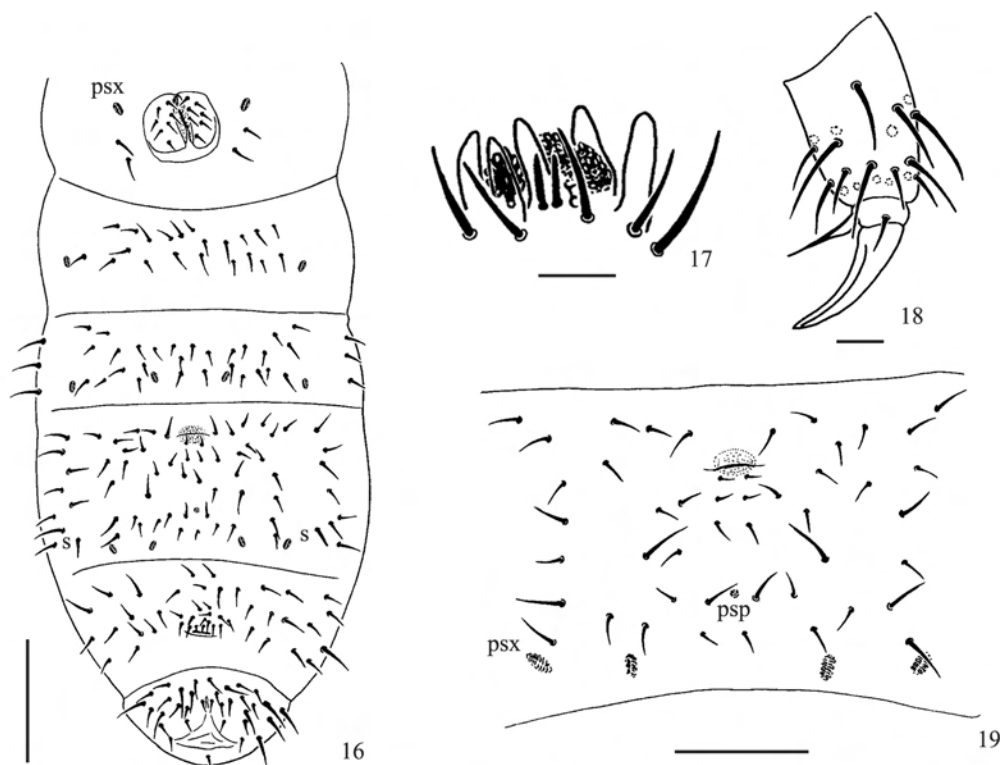
Head. Antennae short and distinctly segmented, 0.8 times as long as head (Fig. 12). Length ratio of antennal segments I : II : III : IV = 1.0 : 1.0 : 1.0 : 1.2. Ant. I with 8 – 9 chaetae. Ant. II with 15 chaetae. Ant. III sensory organ composed of 5 papillae, 5 guard chaetae, 2 small rods and 2 granulated sensory clubs (external one curved and bigger than internal one) (Fig. 17); lateral ms just posterior to sensory organ. Ant. IV subapical organite rod-like; basolateral ms at about 1/4 length from base; invaginated apical bulb absent. Antennal base with distinct granulation. PAO located on cuticular furrow, prolonged on dorsal side of head, built with 1 three-lobed vesicle, rarely two- or four-lobed (Fig. 13). Dorsal cephalic chaeta d0 absent. 3 + 3 p-chaetae between posterior a-pso on head (Fig. 13). Mandible with strong molar plate and 4 apical teeth. Maxilla bearing 3 teeth and 6 lamellae. Maxillary palp simple with 1 basal chaeta and 2 sublobal hairs. Labral chaetae formula 4/342. Labium with 6 proximal, 4 basomedian (E, F, G and f) and 6 basolateral (a, b, c, d, e, e') chaetae (Fig. 14); labial papillae of A type, papillae A – E respectively with 1, 4, 0, 3 and 3 guard chaetae. Postlabial chaetae 3 + 3 along ventral groove (Fig. 14).

Body chaetotaxy. Ordinary chaetae differentiated in meso- and macro-chaetae, ratio Sp: m1: p1 on Abd. V = 1.0 : 0.5 : 1.2 (Fig. 12). Th. I with 6 – 7 + 6 – 7 chaetae dorsally. Three chaetae on both side of axial line and no dorsal axial chaetae from Th. II to Abd. II tergites. Abd. III and IV tergite with or without dorsal axial chaetae, number quite variable. Abd. V tergite without axial chaeta, m0 rarely present. Abd. VI with two dorsal axial chaetae (a0 and p0) (Figs 12, 15). Th. I, II and III sternites with 0 + 0, 1 – 2 + 1 – 2, 1 – 2 + 1 – 2 chaetae respectively, rarely 3 chaetae in one side of Th. II – III.

Appendages. Subcoxa 1 of legs I, II and III with 4, 5 and 5 chaetae, subcoxa 2 with 1, 4 and 4 chaetae respectively. Tibiotarsi of legs I, II and III with 20 (11, 8, 1), 20 (11, 8, 1) and 20 (11, 8, 1) chaetae (Fig. 18). Unguis without teeth. Unguiculus slender and pointed, 0.7 times as long as inner edge of unguis, with inner basal lamella (Fig. 18).



Figs 12 – 15. *Oligaphorura ursi* Fjellberg, 1984. 12. Dorsal side of body. 13. Dorsal side of head. 14. Ventral side of head. 15. Dorsal side of Abd. IV – VI. Scale bars: 12 – 15 = 0.1 mm.



Figs 16 – 19. *Oligaphorura ursi* Fjellberg, 1984. 16. Ventral side of Abd. I – VI. 17. Organ of Ant. III. 18. Distal part of leg I. 19. Furcal area. Scale bars: 16, 19 = 0.1 mm; 17 – 18 = 0.01 mm.

Ventral tube with 7 + 7 distal chaetae, 2 – 5 + 2 – 5 basal chaetae, without anterior chaetae (Fig. 16). Furca reduced to a small cuticular fold with 2 + 2 chaetae posterior to furcal rudiment (Fig. 19).

Female genital plate with 10 – 14 anterior and 2 genital chaetae, male genital plate with 22 – 24 anterior

and 8 genital chaetae. Male ventral organ absent. Anal valves with numerous acuminate chaetae; each lateral valve with chaetae a0 and 2a1; upper valves with chaetae a0, 2b1, 2b2, c0, 2c1, 2c2. Anal spines set on indistinct papillae, 0.8 times as long as inner edge of leg III unguis.

Habitat. In the farmland cropped with soybean and meadow wetland.

Distribution. China (Heilongjiang); Northern Holarctic.

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中国东北地区棘跳科 (弹尾纲, 原跳目) 新纪录族一新种及一新纪录种

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摘 要 记述采自中国东北地区棘跳科 1 新纪录族小角棘跳族 Oligaphorurini 1 新种, 三江双型棘跳 *Dimorphaphorura sanjiangensis* sp. nov. 及 1 新纪录种, 北极小角棘跳 *Oligaphorura ursi* Fjellberg, 1984, 附详细描述及特征图。研究标本保存于中国科学院东北地理与农业生态研究所湿地生态与环境重点实验室。

三江双型棘跳, 新种 *Dimorphaphorura sanjiangensis* sp. nov. (图 1 ~ 11)

鉴定特征 假单眼模式: 身体背面 32/033/333430, 腹面 11/000/000000, 3 对足第 1 亚基节分别具 1 个。拟单眼模式: 身体背面不存在, 腹面 00/000/122203, 3 对足第 1 亚基节分别具两个。腹部第 4 节背面具 2 根中间毛 (a0 和 m0), 第 5 节背面不具中间毛, 第 6 节背面具 2 根中间毛 (a0 和 p0)。腹管每侧具 7 根远端毛, 2 根基部毛, 不具前端毛。弹器退化为 1 个颗粒状的区域, 后面具 1 + 1 根毛。具臀刺, 乳突不明显。

正模 ♀, 采自黑龙江省洪河农场的旱田大豆地土壤层

中; 2010-10-01, 常亮等采。副模: 3 ♀ ♀, 1 ♂, 特征与正模相同, 采集地点及时间同正模。

词源: 新种种名源自模式标本采集地三江平原。

北极小角棘跳 *Oligaphorura ursi* Fjellberg, 1984 中国新纪录 (图 12 ~ 19)

鉴定特征 假单眼模式: 身体背面 32/133/333430, 腹面 11/000/000000, 3 对足第 1 亚基节上分别具 1 个。拟单眼模式: 身体背面不存在, 腹面 00/000/122200, 3 对足第 1 亚基节上不存在。腹部第 3、4 节背面具或不具中间毛, 数目存在变异; 第 5 节背面通常不具中间毛, 很少具中间毛 m0; 第 6 节背面具 2 根中间毛 (a0 和 p0)。腹管每侧具 7 根远端毛, 2 ~ 5 根基部毛, 不具前端毛。弹器退化为一个表皮皱褶状结构, 后面具 2 + 2 根毛呈两排排列。具臀刺, 乳突较明显。

检视标本: 15 ♀ ♀, 采自黑龙江省前进农场的旱田大豆地土壤层中, 2010-10-01, 常亮等采; 11 ♀ ♀, 5 ♂ ♂, 采自黑龙江省前进农场的小叶章草甸湿地土壤中, 2011-05-26, 武海涛等采。

关键词 弹尾纲, 棘跳科, 小角棘跳族, 双型棘跳属, 新种, 小角棘跳属, 新纪录, 中国东北。

中图分类号 Q969.14

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